جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

King Abdullah University of Science and Technology

KAUST Academy – CEMSE Division

MPS MoI-AI and MPS MoI-Cyber Security Bridging Program: Python Syllabus

Course dates JAN 12-16

Course Objective

The objective of this Python programming course is to provide beginners with a comprehensive introduction to the core concepts and tools needed to write simple, functional Python code. By the end of the week, students will have the foundational knowledge necessary to write their own scripts and tackling basic programming challenges.

General Description

We introduce loops and functions on Day 1. Students will explore `while` and `for` loops, along with control statements. The session on functions covers how to define them, return values, and use docstrings, with an emphasis on different types of parameters (such as multiple, default, named, and arbitrary) and concepts like recursion and anonymous functions. On Day 2, the focus shifts to file handling, starting with an introduction to file paths and the differences between sequential and random access. The class will cover reading from and writing to files, file manipulation, and working with CSV and binary files. On Day 3, we introduce the `NumPy` library: students will learn about arrays, including their creation, manipulation, reshaping, and broadcasting. Operations on arrays and matrices are covered, along with techniques for identifying unique items and counting them. The last theoretical session will be on Day 4 with an introduction to classes, where students will learn the basic concepts of object-oriented programming, including how to define a class and an introduction to inheritance. After completing these four days, students will be prepared for the course exam on Day 5, which includes a 30-minute quiz in the morning, followed by a 120-minute programming test in the afternoon. The exam will assess their ability to apply the concepts learned during the course by writing Python code, and students will be allowed to refer to course slides but not use the internet during the test.

Instructors

The instructor for the course is Fabio CREDALI (fabio.credali@kaust.edu.sa). The three teaching assistants are Ali Habibullah, Achref Ribai and ???.

Schedule

The class meets for a week (Sunday to Thursday). Each day consists of two different types of sessions: lectures and problem solving sessions. During each lecture, the topic is presented by the instructor. After the lectures, the students solve problems in small groups to apply, practice, discuss and reinforce their learning. Both the instructor and the teaching assistants are available to help and answer questions.

Detailed Plan

The plan for the week is as follows:

Sunday: Loops and Functions

- **Loops**
  - While Loop
  - For Loop
  - Break Loop statement
  - Continue Loop statement
  - For Loop with Else
- **Functions**
  - What are functions?
  - How functions work
  - Defining functions
  - Returning values from functions
  - Docstring
  - Function parameters: multiple, default, named and arbitrary arguments
  - Recursive functions
  - Anonymous functions

Monday: Working with files

- **Introduction to Files**
  - Paths
  - Sequential access versus Random access
- **Reading and Writing Files**
  - Obtaining references to files
  - Reading files and contents iteration
  - Writing data to files
  - Renaming and Deleting files (the `os` library)
  - Random access
- **CSV Files**
  - CSV Writer and Reader
- **Introduction to binary files**

Tuesday: Introduction to NumPy

- **Arrays**
  - What is an array?
  - Array fundamentals
  - Creation, manipulation, reshaping of arrays
  - Broadcasting
  - Operations involving arrays
  - Matrices
  - How to get unique items and counts

Wednesday: Introduction to Classes

- **Basic concepts**
  - What is a Class?
  - Class definition
  - An introductory example
  - Hints on Class inheritance

Thursday

- Morning:
  - Review session of Key Concepts
  - Answering any questions
  - MCQ test
- Afternoon:
  - Test

Evaluation

On the final day, after the review and Q&A session, students will take a 30-minute quiz in the morning, consisting of 10 multiple-choice questions (MCQs). This quiz will be a closed-book, closed-notes assessment, with no calculators or laptops allowed. In the afternoon, students will complete a 120-minute programming test to assess their ability to write Python code. The test will be conducted on a laptop with no internet access, and students may only refer to the course slides.

- 10 multiple choice questions.
- 3 questions where the student implement their own codes.